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## DEPARTMENTS.

### SOLUTIONS OF PROBLEMS.

#### ALGEBRA.

340. Proposed by W. J. GREENSTREET, M. A., Editor of The Mathematical Gazette, Stroud, England.

Let  $S_{n-1} = 1^{n-1} + 2^{n-1} + 3^{n-1} + \dots + (n-1)^{n-1}$ . Find  $n$  if  $S_{n-1} - (n-1)$  is a multiple of  $n^2$ .

No complete solution of this problem has been received.

341. Proposed by O. L. CALLICOTT, Gettysburg, South Dakota.

Prove that the sum of the series,  $\frac{1}{1.2} + \frac{1}{3.4} + \frac{1}{5.6} + \dots$  to infinity = the sum of the series  $\frac{1}{2} \cdot 1 + \frac{1}{2^2} \cdot \frac{1}{2} + \frac{1}{2^3} \cdot \frac{1}{3} + \frac{1}{2^4} \cdot \frac{1}{4} + \dots$  to infinity.

Solution by J. SCHEFFER, A. M., Hagerstown, Md.

$$\frac{1}{(n+1)(n+2)} \equiv \frac{1}{n+1} - \frac{1}{n+2}$$

Hence, by substituting for  $n$ , 0, 1, 2, 3, ..., and adding, we have

$$\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \dots = \frac{1}{1} - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \dots = \log 2.$$

Now  $-\log(1-x) = x + \frac{x^2}{2} + \frac{x^3}{3} + \dots$ , which for  $x = \frac{1}{2}$ , becomes

$$-\log\left(\frac{1}{2}\right) = \log 2 = \frac{1}{2} + \frac{1}{2}\left(\frac{1}{2}\right)^2 + \frac{1}{3}\left(\frac{1}{2}\right)^3 + \dots$$

This proves the proposition.

Also solved by V. M. Spunar.

#### GEOMETRY.

367. Proposed by W. J. GREENSTREET, M. A., Stroud, England.

The tangents from a point  $A$  to a circle are bisected by a line  $XYZ$ , which cuts a chord in  $X$  and the tangents at its extremities in  $Y$ ,  $Z$ . Show that  $XAY = XAZ$ , or  $XAY = \pi - XAZ$ . Also, reciprocate with respect to  $A$ .